



Gypsum Bedding in Bedded Pack Barns May Also Create Dangerous Conditions

Bedded Pack Manure Storages Can Produce Dangerous Levels of Manure Gases, Including Hydrogen Sulfide, Especially When Gypsum or Other Sources of Available Sulfur are used as Bedding

DANGEROUS LEVELS HAVE BEEN MEASURED!

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Last week we reminded farmers and manure handlers that all stored manure can produce hazardous gases at levels of concern in some conditions. Some of these gases (like hydrogen sulfide [H_2S]) are toxic and heavier than air and therefore are prone to sink to low areas like storage pits, sumps, or other depressions and accumulate to potentially *LETHAL* levels.

We also reported specifically on concerns we have with possible increased risk for exposure to high levels of H_2S from long-term liquid manure storages used to store manure from barns where gypsum is used for cow bedding. These concerns are based on recent measurements taken by staff from the Benton fire department and the Yates County Soil and Water Conservation District (SWCD) where greater than 100 ppm H_2S was measured at the edge of a long-term liquid manure storage structure. This level is identified as immediately dangerous according to the US Occupational Safety and Health Administration (OSHA). The Yates County measurements are consistent with reports of high levels measured on at least one Pennsylvania farm where gypsum also was used for bedding and manure was stored. Gas concentrations are rapidly diluted with distance from the storage structure, so there should be little or no concern during agitation or clean out beyond the immediate farmstead.

What's New?

Since last week it has come to our attention that gypsum is also being used by some New York State farmers as a bedding material ***in deep bedded pack barns***. Deep bedded pack systems have the same anaerobic (little or no oxygen) conditions as long-term liquid manure storages – the conditions needed for the formation of H_2S by microbes. Therefore, the potential for human exposure to high levels of H_2S is possible with bedded pack situations as well as long-term liquid manure storages. In fact, the opportunity for a farmer to be exposed to high levels of H_2S may possibly be even higher with bedded packs, especially during clean-out. The packs are normally under roof, and enclosed barns may not provide enough air movement to maintain safe working conditions.



Late last week, staff from the Benton fire department and Yates County Soil and Water Conservation District (SWCD) measured more than 100 ppm H₂S in a barn where a deep bedded back was being removed. Once again, gypsum had been used as part of the overall bedding material.

As a reminder, human exposure to hydrogen sulfide levels above 20 ppm can cause headaches, dizziness, and fatigue. According to OSHA, a concentration of 100 ppm H₂S is immediately dangerous to life and health because the symptoms can make it difficult or impossible to escape from a dangerous situation. Levels over 100 ppm paralyze the olfactory nerve (sense of smell) causing the victim to not know they are breathing in the gas, and exposure at this level for 48 hours may cause death. At levels above 500 ppm, staggering and collapse can occur in 5 minutes, death after 30-60 minutes. Since we are finding random air samples over 100 ppm H₂S, it is possible to have pockets of H₂S near or in storage/bedded pack structures during agitation or clean-out that are at much higher levels.

Farmers, family members, workers, and visitors are urged to avoid any and all manure gases, especially from long-term storages or bedded packs where gypsum is mixed in with manure in any significant quantities. Note: for operations that daily haul manure and use gypsum for bedding, we expect little or no production of H₂S, but care should be taken to minimize risks here too.

When cleaning out a barn's bedded pack manure:

- Make sure no unnecessary people are near the pack, especially at the location where the pack is being removed.
- If hand clean-out is required using pitchforks, consider wearing a belt-mounted personal gas exposure alarm system to alert you if exposure is exceeding safe limits.
- Open all barn doors, windows, curtains and any other air inlets/outlets if the barn is naturally ventilated or turn on the mechanical ventilation system to full capacity before beginning the clean out process.
- Set up large fans and/or blowers around where operators will be working to mix air and dilute any gases.

In conditions where sufficient ventilation cannot be achieved, equipment operators properly trained on use of a respirator and who are wearing them should be the only ones working in the barn when clean out is occurring. In addition to the above, farmers should:

- Consider using other materials for bedding until this issue is better understood.
- Have an emergency plan in place.
- Train all family members and employees in the dangers of manure gases.

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